THAT WHICH IS CLAIMED:

1. A method of constructing a preform for use in forming a machined structural assembly, comprising:

determining the dimensions of the machined structural assembly;

selecting first and second structural members based on the dimensions of the machined structural assembly;

positioning the first structural member adjacent the second structural member so as to define at least two contact surfaces therebetween; and

friction welding the at least two contact surfaces of the first and second structural members to construct the preform such that the preform has dimensions approximating the dimensions of the machined structural assembly to thereby reduce material waste and machining time when forming the machined structural assembly.

2. A method according to Claim 1 wherein said friction welding step comprises:

moving at least one of the first and second structural members relative to the other;

concurrently with said moving step, urging at least one of the first and second structural members toward the other to thereby generate frictional heat about the at least two contact surfaces;

terminating said moving step; and

concurrently with said terminating step, urging at least one of the first and second structural members toward the other as the at least two contact surfaces cool to thereby form a friction weld joint at least partially between the at least two contact surfaces.

3. A method according to Claim 2 wherein said moving step comprises oscillating at least one of the first and second structural members relative to the other structural member.

4. A method according to Claim 2 wherein said moving step comprises simultaneously moving the first and second structural members in opposing directions, wherein the opposing directions are parallel to the at least two contact surfaces.

5. A method according to Claim 1 further comprising forming a relief groove proximate to at least one of the at least two contact surfaces prior to said positioning step.

6. A method according to Claim 1 further comprising cleaning at least one of the at least two contact surfaces prior to said positioning step.

7. A method according to Claim 1 further comprising processing at least one of the first and second structural members before said friction welding step, wherein said processing step comprises a material treatment selected from the group consisting of heat treating, aging, quenching, stretching, annealing, and solution annealing.

8. A method according to Claim 1 further comprising friction welding a third structural member to at least one of the first and second structural members.

9. A method of forming a machined structural assembly, comprising:

determining the dimensions of the machined structural assembly;

selecting first and second structural members based on the dimensions of the machined structural assembly;

positioning the first structural member adjacent the second structural member so as to define at least two contact surfaces therebetween; and

friction welding the at least two contact surfaces of the first and second structural members to construct a preform such that the preform has dimensions approximating the dimensions of the machined structural assembly; and

thereafter, machining the preform to remove excess material from the preform to form the machined structural assembly having the predetermined dimensions.

10. A method according to Claim 9 wherein said friction welding step comprises:

moving at least one of the first and second structural members relative to the other;

concurrently with said moving step, urging at least one of the first and second structural members toward the other to thereby generate frictional heat about the at least two contact surfaces;

terminating said moving step; and

concurrently with said terminating step, urging at least one of the first and second structural members toward the other as the at least two contact surfaces cool to thereby form a friction weld joint at least partially between the at least two contact surfaces.

11. A method according to Claim 10 wherein said moving step comprises simultaneously moving the first and second structural members in opposing directions, wherein the opposing directions are parallel to the at least two contact surfaces.

12. A method according to Claim 10 wherein said moving step comprises oscillating at least one of the first and second structural members relative to the other structural member.

13. A method according to Claim 9 further comprising forming a relief groove proximate to at least one of the at least two contact surfaces before said positioning step.

14. A method according to Claim 9 further comprising cleaning at least one of the at least two contact surfaces prior to said positioning step.

15. A method according to Claim 9 wherein said machining step comprises machining at least a portion of the friction weld joint joining the first and second structural members.

16. A method according to Claim 9 further comprising processing at least one of the first and second structural members before said friction welding step, wherein said processing step comprises a material treatment selected from the group consisting of heat treating, aging, quenching, stretching, annealing, and solution annealing.

17. A method according to Claim 9 further comprising processing the preform before said machining step, wherein said processing step comprises a material treatment selected from the group consisting of heat treating, aging, quenching, stretching, annealing, and solution annealing.

18. A method according to Claim 9 further comprising friction welding a third structural member to at least one of the first and second structural members.

19. A preform for use in forming a machined structural assembly of predetermined dimensions, comprising:

a first structural member defining at least one contact surface;

a second structural member defining at least one contact surface, said at least one contact surface of the second structural member being structured to correspond to said at least one contact surface of said first structural member; and

a friction weld joint joining said at least one contact surface of said first structural member and said at least one contact surface of said second structural member such that said first and second structural members form a preform having dimensions approximating the dimensions of the machined structural assembly to thereby reduce material waste and machining time when forming the machined structural assembly.

20. A preform according to Claim 19 wherein said first and second structural members comprise a material selected from the group consisting of aluminum, aluminum alloys, titanium, titanium alloys, nickel-based, steel, copper-based alloys, and beryllium-based alloys.

21. A preform according to Claim 19 wherein said first and second structural members comprise dissimilar materials.

22. A preform according to Claim 19 further comprising a third structural member friction welded to at least one of the first and second structural members.

23. A machined structural assembly prepared by the process comprising the steps of:

determining the dimensions of the machined structural assembly;

selecting first and second structural members based on the dimensions of the machined structural assembly;

friction welding the first and second structural members together to construct a preform such that the preform has dimensions approximating the dimensions of the machined structural assembly; and

thereafter, machining the preform to remove excess material from the preform to form the machined structural assembly having the predetermined dimensions.

24. A machined structural assembly according to Claim 23 wherein said friction welding step comprises:

moving at least one of the first and second structural members relative to the other;

concurrently with said moving step, urging at least one of the first and second structural members toward the other to thereby generate frictional heat about the at least two contact surfaces;

terminating said moving step; and

concurrently with said terminating step, urging at least one of the first and second structural members toward the other as the at least two contact surfaces cool to thereby form a friction weld joint at least partially between the at least two contact surfaces.

25. A machined structural assembly according to Claim 24 wherein said moving step comprises oscillating at least one of the first and second structural members relative to the other structural member.

26. A machined structural assembly according to Claim 24 wherein said moving step comprises simultaneously moving the first and second structural members in opposing directions, wherein the opposing directions are parallel to the at least two contact surfaces.

27. A machined structural assembly according to Claim 23 further comprising forming a relief groove proximate to at least one of the at least two contact surfaces before said positioning step.

28. A machined structural assembly according to Claim 23 further comprising cleaning at least one of the at least two contact surfaces prior to said positioning step.

29. A machined structural assembly according to Claim 23 wherein said machining step comprises machining the friction weld joint joining the first and second structural assembly.

30. A machined structural assembly according to Claim 23 further comprising processing at least one of the first and second structural members before said friction welding step, wherein said processing step comprises a material treatment selected from the group consisting of heat treating, aging, quenching, stretching, annealing, and solution annealing.

31. A machined structural assembly according to Claim 23 further comprising processing the preform before said machining step, wherein said processing step comprises a material treatment selected from the group consisting of heat treating, aging, quenching, stretching, annealing, and solution annealing.

32. A machined structural assembly according to Claim 23 further comprising friction welding a third structural member to at least one of the first and second structural members.